Beringian Research Notes

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Ink sketch by Bonnie Dalzell

North American Short-Faced Bear

North American short-faced bears, (*Arctodus simus* and *Arctodus pristinus*), sometimes picturesquely called "Bulldog Bears," were the largest land carnivores in North America during the ice age (Quaternary the last two million years). They were unusually tall, and highly carnivorous. They ranged from Alaska and the Yukon to Mexico, and from Pacific to Atlantic coasts.

Of the two North American short-faced bears, the giant short-faced bear (*Arctodus simus*) was the largest (Figure 1) the biggest known skull being from the Yukon. This bear is distinguished from the lesser short-faced bear (*Arctodus pristinus*) by larger size; bigger, broader, more

crowded teeth; a shorter face and relatively longer legs. The largest animals were nearly 1.5 m high when walking normally, but stood about 3.4 m when up on their hind legs. They could have had a vertical reach of more than 4.3 m about 1.2 m above a basketball hoop!

Although much taller than brown bears (*Ursus arctos*), giant short-faced bears were not so heavily built (Figure 2). Their limbs, particularly the hindlimbs, were longer and more slender. A calculation of the autumn weight of a giant short-faced bear (with its full component of fat), based on diameter of the upper hind leg (femur) shaft, is approximately 700 kg. The largest known polar bear (*Ursus maritimus*) recorded in Canada, weighed 660 kg.

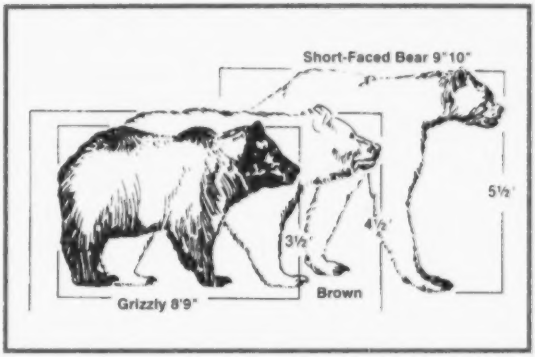

Figure 2: Relative size comparisons of grizzly, brown, and giant short-faced bears. Ruth Anne Border, 1988

The face of *Arctodus simus* was unusual in its lack of a well-marked forehead and the presence of a short broad muzzle in this respect resembling a lion rather than any of the living North American bears. A striking feature of the largest skull, from Gold Run Creek, Yukon, is its great width relative to length (nearly 80% compared to recent brown, black and Pleistocene[1] cave bears [*Ursus spelaeus*], which are all less than 70%). Certainly, the muscles which passed between the broad cheek bones to power the lower jaws were extremely well-developed, as would be expected in a highly carnivorous bear, and perhaps one adapted for bone crushing in order to obtain the rich marrow. Also, you can readily tell an *Arctodus* lower jaw from those of the genus Ursus by the slanting ridge dividing muscle attachment areas (premasseteric from masseteric fossae).

Another important difference from recent North American bears was that, rather than being "pigeon-toed" and having a waddling gait, *Arctodus simus* had toes extending straight forward, presumably being able to move more easily. In addition, a passage for a slip of muscle (entepicondylar foramen) on the lower inside portion of the upper foreleg (humerus) occurs in *Arctodus*, but not *Ursus*. Perhaps a series of large, five-toed tracks preserved in a consolidated mudflow deposit of possible Quaternary age near Lakeview, Oregon belongs to *Arctodus*.

Bears display as much, or more, individual and sexual variation than any other mammalian group. Most living North American adult male bears are about 20% bigger than the females, and *Arctodus* shows the same kind of variation. However, specimens from Alaska, Yukon, Nebraska, California (Irvington) and perhaps Utah, probably mostly males, are much larger than the largest males from Rancho La Brea (Los Angeles, California) and other sites. Therefore, they are recognized as a different subspecies (*Arctodus simus yukonensis*) than the smaller form (*Arctodus simus simus*).

Two subfamilies of bears occupied North America during the ice age: the Ursinae, comprising the living North American bears and their Pleistocene forerunners, and having its origins in the Old World; and the Tremarctinae of New World origin, comprising three species of the genera Tremarctos and Arctodus (with additional species in South America: Arctodus bonariensis having enormous canine teeth and carnassials [sharp cheek teeth]; Arctodus pamparus, similar

[1] The Quaternary includes the Pleistocene and the Holocene (the last 10,000 years).

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Figure 3: Right side view of Arctodus simus, *female in early adulthood. Note the curving upper profile of the cranium and short snout. (CNM photo)*

to *Arctodus bonariensis* but having smaller carnassials; and *Arctodus brasiliensis*, resembling Arctodus pristinus but with larger upper first molar teeth). The dawn bear (Ursavus), which lived in Europe from early to middle Miocene time (about 22 to 15 million years ago), probably gave rise to the two sub-families mentioned. The earliest member of the Tremarctinae is Plionarctos of Pliocene age (about five to two million years ago) from Texas. Likely, this genus is ancestral to the spectacled bear (Tremarctos) and the short-faced bear (Arctodus). Although the early history of Arctodus is poorly known, it evidently became widespread in North America about Kansan time[2] (about 800,000 years ago). Perhaps Arctodus brasiliensis (the smallest known Arctodus) lies near the ancestor that gave rise to South and North American branches of the genus.

Of the two North American short-faced bear species, *Arctodus pristinus* is more primitive and could be ancestral to *Arctodus simus*. *Arctodus pristinus* lived near the Atlantic coast and in Mexico from Kansan to Wisconsinan (about 800,000 to 10,000 years ago) time. With its relatively longer face, smaller, narrower teeth, and smaller stature, this bear may have been more omnivorous (eating plants as well as animals) than *Arctodus simus*. Perhaps the lesser short-faced bear died out through competition with a large Pleistocene subspecies of black bear (*Ursus americanus amplidens*), as well as brown bears invading from the west.

The giant short-faced bear evidently occupied higher, well-drained grasslands mainly west of the Mississippi River, whereas the lesser short-faced bear preferred moister, more heavily-wooded eastern coastal regions. The former species had reached its northernmost range (as well as reaching maximum size) in the Yukon and Alaska by the mid-Wisconsinan interstadial. This is indicated by a series of radiocarbon dates on bone focusing on that period.

For example, approximate radiocarbon dates on Yukon *Arctodus* specimens are: 44,000 B.P. on an upper footbone from Sixtymile; 29,600 B.P. on a humerus excavated from frozen silt on Hunker Creek; 26,000 B.P. on the massive adult male cranium from Gold Run Creek; 25,000 B.P. on the facial region of an adult male from Hunker Creek; and 20,000 B.P. on an excellently-preserved cranium of an adult female from Ophir Creek (Figure 3), which shows that this bear survived at least until the cold peak of the last glaciation in Eastern Beringia (unglaciated parts of Alaska, Yukon and adjacent Northwest Territories). The only other recorded Canadian specimens are from mid-Wisconsinan deposits at Edmonton, Alberta and possibly last interglacial deposits at Lebret, Saskatchewan.

Presumably the giant short-faced bear was a rather solitary scavenger or predator except for mothers with cubs and during the mating period. The light, long-legged, short-necked body; the skull with its vise-like jaws, stout fangs and short, broad muzzle (like lions) all indicate that

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[2] The ice age included four major glaciations in North America: the oldest is known as the Nebraskan, and was followed by the Kansan, Illinoian and Wisconsinan. Between these were the warmer interglacials (Aftonian, Yarmouthian and Sangamonian), in which the climate was similar to or warmer than that of today. The glaciations sometimes included relatively warm intervals called interstadials.

this animal was capable of bursts of speed when necessary and covering large areas for prey or for carcasses on which to scavenge. Further, it was the largest, most powerful carnivore among the Pleistocene land mammals of North America. Isotopic analysis of Alaskan and Yukon short-faced bear bones supports the idea that they were highly carnivorous. The great width between the canine teeth may have allowed a more secure grip on prey and/or the wide snout might be related to a keenly developed sense of smell. The situation is similar in the polar bear the most carnivorous of living bears. *Arctodus simus* may have scavenged and preyed on large herbivores, such as bison (Figure 1), muskoxen, caribou, deer, horses and ground sloths.

Remains of these bears are sometimes found in caves. Evidently bones of eight individuals from Potter Creek Cave, California were all females, suggesting denning for reproductive purposes. However, in other caves, remains of both sexes have been found. Analysis of *Arctodus simus* bones show that they occasionally suffered from diseases such as osteomyelitis, tuberculosis-like and possibly syphilis-like infections.

Arctodus simus died out toward the close of the last glaciation, perhaps partly because of the earlier extinction of some of the large herbivores that it may have preyed upon or scavenged, and partly because of increased competition with brown bears, which apparently entered North America during the Illinoian glaciation (some 200,000 to 130,000 years ago). The last view has been challenged by a 1995 study of paleodiet and ecology of short-faced and brown bears. Two radiocarbon dates on *Arctodus* bone from Texas and Utah of about 12,650 B.P., and a third of 11,500 B.P. from Little Box Elder Cave, Wyoming, are the most recent ones recorded. The latter cave contains the only known association of *Ursus arctos* and *Arctodus simus* in southern North America. Farther north, in the western Yukon, the species lived together during the mid-Wisconsinan interstadial, according to radiocarbon dates on brown bear bones of about 41,000 B.P. and 36,500 B.P.

Tremarctos ornatus, the spectacled bear of South America, is the closest living relative of the extinct North American short-faced bears.

C.R. Harington
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North American Short-Faced Bears. Reproduced courtesy of the Canadian Museum of Nature, Ottawa.

Additional Reading:

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The Beringian Research Notes series presents vignettes of life in the Yukon during the last Ice Age.

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